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Relationship between Mucormycosis and Coronavirus: A Review

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Abstract: *The human immune system is predominantly damaged and weakened by the coronavirus. As a result, even after recovering from one infection, the patient's immune system is insufficient to protect him from other ailments such as bacterial and fungal infections. One of the negative effects of Covid-19 infection is mucormycosis. Mucormycosis is a fungus infection caused by fungi belonging to the Mucorales family. These fungi can be found in soil, compost piles, decomposing wood, and decaying organic waste such as leaves, among other places. Every day, everyone is exposed to millions of fungus spores. Safe people, on the other hand, have a strong immune system to keep them safe. Many fungal infections spread quickly after Covid-19 infection due to the patient's weakened immune system. Mucormycosis is a common fungus that affects people who have had Covid-19 or who have had it after having Covid-19. Mucormycosis is an extremely rare disease. Persons with weakened immune systems are more susceptible to infection, although it can even strike seemingly healthy people in rare cases. Following Covid-19 infestations, there are a variety of immune-boosting foods to pick from, each of which help in building immunity and battling a number of virus infections. Protein-rich diets, omega-3 fatty acid-rich meals, high antioxidant-rich meals, and the most important pharma-therapeutic foods like garlic, turmeric, and green tea should be consumed after Covid-19 infections.*

Keywords*: Coronavirus infection, Mucormycosis, fungal infection, immune-boosting foods, rhinocerebral, pulmonary (lung), cutaneous mucormycosis, gastrointestinal mucormycosis, and disseminated mucormycosis are some of the terms used to describe mucormycosis.*

I. Introduction

People are striving to prevent the spread of coronavirus infection all over the world these days. The coronavirus initially appeared in China in 2019, and since then, it has spread to nearly every country in the world. Coronavirus primarily affects the human immune system and weakens it. As a result, even after healing from this infection, the patient's immune system is insufficient to defend him from additional illnesses such as bacterial and fungal diseases. One of the negative effects of Covid-19 infection is mucormycosis.

Mucormycosis: Mucormycosis is a fungal infection caused by fungus that belongs to the Mucorales family (Hibbett et al., 2007). Mucormycosis (sometimes called zygomycosis) is an uncommon fungal infection caused by Mucoromycotina fungi. The old scientific term for these fungi was Zygomycota, however it was recently altered. These fungus can be found in soil, as well as decaying organic materials such as leaves, compost piles, and rotting wood. The presence of hyphal infiltration of sinus tissue and a temporal course of fewer than four weeks characterize mucormycosis (Ferguson, 2000); (Chakrabarti et al., 2009).

Risk factors of Mucormycosis: Uncontrolled diabetes mellitus in ketoacidosis, other forms of metabolic acidosis, corticosteroid treatment, organ or bone marrow transplantation, neutropenia, trauma and burns, malignant hematologic disorders, and deferoxamine therapy in hemodialysis patients are all major risk factors for mucormycosis (Spellberg et al., 2005); (Sugar, 1992); (Ibrahim et al., 2003). Because of the expanding frequency of diabetes mellitus, cancer, and organ transplantation in the aging US population, the number of people at risk for this lethal illness is rapidly increasing (Marr et al., 2002). The overall death rate for mucormycosis is still around 50%, and in patients with disseminated disease or prolonged neutropenia, it can reach 100% (Spellberg et al., 2005);

(Gleissner et al., 2004). New tactics for preventing and treating mucormycosis are plainly needed, and a detailed understanding of the disease's etiology can help.

Sign and Symptoms of Mucormycosis: Sign and Symptoms normally manifest first in the infected body region and include the following (David, 2021):

- Fever,
- headache,
- Reddish and swollen skin over nose and sinuses,
- Eye(s) swelling,
- Facial pain,
- Dark scabbing in the nose by eye(s),
- Visual problems,
- shortness of breath,
- Diffuse abdominal pain,
- coughing sometimes with bloody or dark fluid production,
- Flank pain,
- Bloody and sometimes dark vomitus,
- Abdominal distension,
- An ulcer with a dark center and sharply defined edges, and
- Mental-status changes may occur.
- Covid-19 and Mucormycosis

Every day, everyone is exposed to millions of fungus spores. Healthy people, on the other hand, have a strong immune system to protect them. However, because the patient's immune system is weakened by Covid-19, many fungal infections spread quickly following the infection. Mucormycosis is a common fungal illness that affects persons who have already been diagnosed with Covid-19. Mucormycosis is a disease that is rather infrequent. The infection is more prevalent in those with weakened immune systems, but it can also strike apparently healthy people on rare occasions.

Tabarsi (2021) found that 2019 is the year of the coronavirus (COVID-19) rst appeared in Wuhan, China in December 2019, and the number of bacterial and fungal coinfections has been steadily increasing since then. While COVID-19-associated invasive pulmonary aspergillosis is becoming more widely recognized, there is little evidence on COVID-19-associated mucormycosis. We present the case of a 50-year-old woman with uncontrolled diabetes who was treated with systemic corticosteroids and remdesevir during her COVID-19 stay. The patient was readmitted a few days later due to face swelling and numbness, and PCR and DNA sequencing confirmed a diagnosis of COVID-19 related rhinosinusitis mucormycosis caused by Rhizopus oryzae. The goal of this research is to highlight the necessity of short-term follow-up in COVID-19 patients who have received systemic corticosteroids, especially those with predisposing factors, because early detection and urgent treatment of invasive fungal infections is critical.

Revannavar (2021) noted that a diabetic woman in her forties appeared with left-sided facial pain, full ptosis, and a brief fever. She had hyperglycemia without ketosis at the time of her presentation. The left eye was completely paralyzed, with a visual acuity of 6/36. She tested positive for COVID-19 by chance. Left-sided pansinusitis with acute infarction in the left parieto-occipital area without angioinvasion was discovered on CT paranasal sinus and MRI brain. On histological investigation, mucormycosis was verified in an emergency functional endoscopic sinus surgery. Repeat CT scan indicated improvement in mucosal thickness and sinusitis after 1 week of standard amphotericin B and antibiotics. In a patient with non-ketotic diabetes and COVID-19, this episode of mucormycosis was associated with rapid progression to orbital apex syndrome with brain infarction. To avoid further end-organ damage, early diagnosis and therapy are critical. There was no angioinvasion, and the temporary periarterial inflammation was related to the brain infarction.

Karimi Galougahi (2021) noted that mucormycosis is a fungal infection caused by organisms from the Mucorales order. These organisms are common in nature, but they can cause catastrophic rhino-orbito-cerebral infection in vulnerable patients, as demonstrated in this instance. This patient's new-onset glucocorticoid-induced hyperglycemia and steroid-induced immunosuppression may have predisposed him to invasive mucormycosis. COVID-19, which was present at the time of readmission, could have have contributed to mucormycosis susceptibility. COVID-19 causes endothelialitis and microvascular thrombosis in the pulmonary and extrapulmonary vascular beds3, which may exacerbate the angioinvasive effects of mucormycosis, which often ends in tissue infarction. Furthermore, COVID-19 has the potential to disrupt immunological function (e.g., by inducing

lymphopenia). It may thus predispose to an opportunistic infection like mucormycosis when paired with steroid-induced immunosuppression.

II. Conclusion

The Coronavirus primarily affects and weakens the human immune system. As a result, even if the patient recovers from the infection, his immune system will not be able to protect him from additional ailments including bacterial and fungal infections. One of the negative effects of Covid-19 infection is mucormycosis. Mucormycosis is a fungus infection caused by fungi belonging to the Mucorales family. These fungi can be found in a variety of settings, including soil, compost piles, rotting wood, and decaying organic items like leaves. Everyone is exposed to millions of fungal spores every day. People who are healthy, on the other hand, have a robust immune system to protect them. Due to the patient's weakened immune system, different fungal infections spread swiftly after Covid-19. Mucormycosis is a frequent fungus that affects patients who have taken Covid-19 or have had it after they have gotten Covid-19. Mucormycosis is a very uncommon fungus. The virus is more likely to infect those who have compromised immune systems, although it can also hit people who appear to be in good health on rare occasions. Following Covid-19 infestations, there are a range of immune-boosting meals to choose from, each of which aids in the development of immunity and the prevention of a number of virus infections. Following Covid-19 infections, protein-rich diets, omega-3 fatty acid-rich meals, foods high in antioxidants, and the most significant pharma-therapeutic foods, such as garlic, turmeric, and green tea, should be ingested.

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